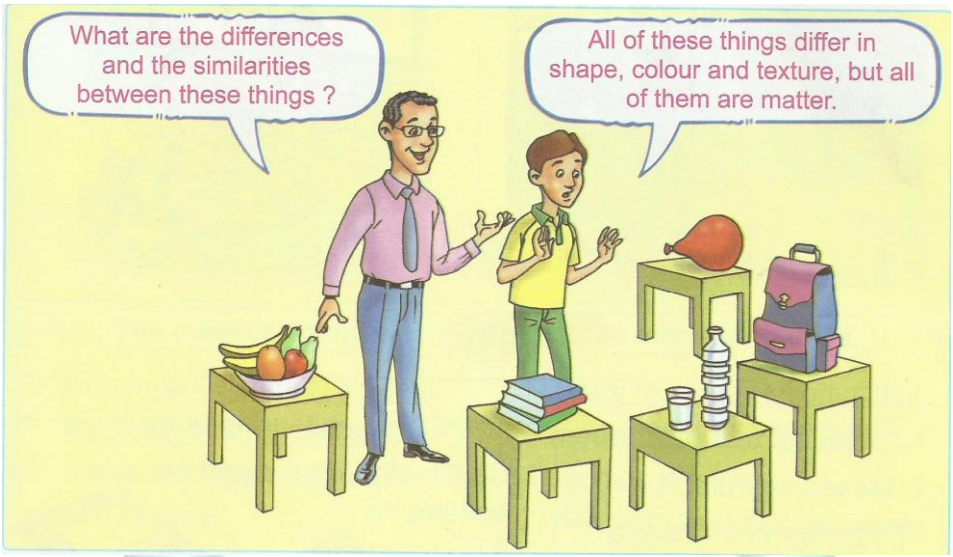
Measuring tools


What are the differences and the similarities between these things ?
All of these things differ in shape, colour and texture, but all of them are matter.

Did you pass through these tables , and observe the similarities and differences between these materials?

Matter
It is anything that has a mass and volume.
Or
It is everything that has a mass and occupies a part of space.

Mass:
It is the amount of matter that the object contains.

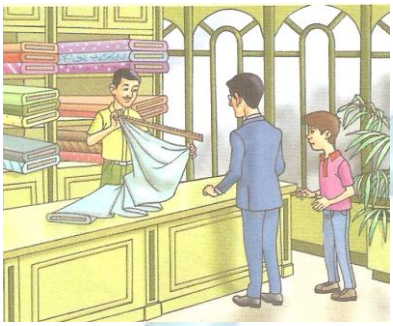
Volume
It is the space that is occupied by the object (matter).

Give reasons :

The Air is matter ?
The car has avolume ?
Water is matter ?

To deal with some matter, we must measure their length, mass or volume. ☺

1 – Length



To buy cloth,
We must measure the length of cloth.

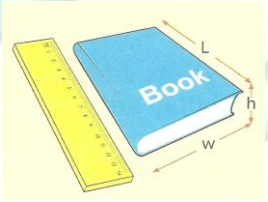
To buy shoes,
We must know the length of your foot.

Length

The measuring tools | **the measuring units**

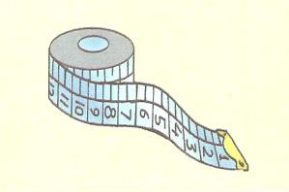
1 – measuring ruler.

For small lengths



2 – Graduated tape.

For very large lengths



1 – Centimetre (Cm)
For measuring small lengths as pen or book.

2 – Metre (m)
For measuring large lengths as dimensions of your classroom.
1 meter (m) = 100 centimetres (cm).

3 – kilometer (km)
For measuring very large lengths as Distance between cario and Alexandria.
1 kilometer (km) = 1000 metres (m)

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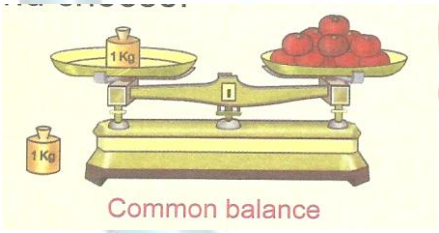
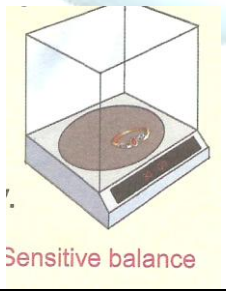
2 - Mass

Did you try to buy banana?!
How much did you buy?!

Mass

The measuring tools — **the measuring units**

1 – common balance (two-pan balance) For things like tomato and cheese.  Common balance **2 – Sensitive balance** For tiny (small) objects like gold and chemicals.  Sensitive balance	**1 – Gram (g)** Measure small masses such as jewellery. **2 – kilogram (kg)** Measure large masses such as fruits and vegetables. 1 kilogram = 1000 grams. **3 – Ton** Measure masses of heavey objects like cars. 1 Ton = 1000 kilograms.

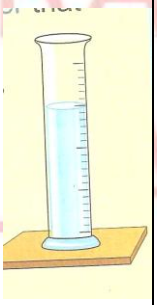
3 – Volume

Did you buy milk before?!

How many liters did you buy?!

Volume

the measuring tools | **the measuring units**

1 – A graduated cylinder **It measure volume of liquids as:** **((water , oil , milk …..))** **Or an irregular solid body.**  **2 – A ruler that measures the dimensions of a regular solid body.**	**1 – Litre or milliliter** **For measure volmes of liquds only.** **2 – the cubic metre (m^3) or** **Cubic centimeter (cm^3)** **For measure volumes of solids and liquids.** **1 litre = 1000 millilitres (cm^3)**

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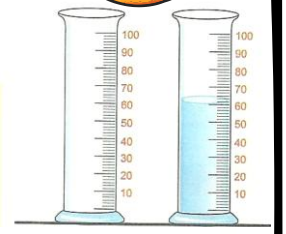
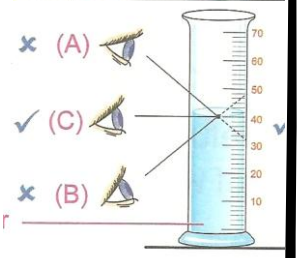
The ways (methods) of measuring the volumes

1 – Estimating the volume of liquid (water):

A: pour an amount of water into graduated cylinder.

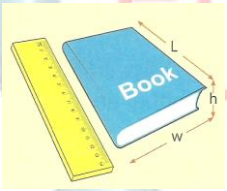
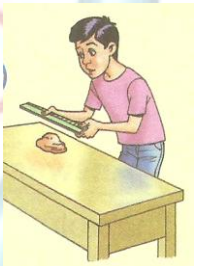
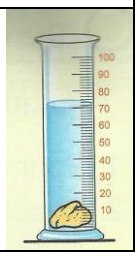
B: record the reading at lower level of water surface.





**** your eyes must be in horizontal position with lower point of liquid surface to get right reading.**
The correct reading is 40

2 – Estimating the volume of solid body ((regular or irregular)).

A :Regular solid body	B: Irregular sold body
Cuboid as a box or a book: **Measure the length , width and height of the book by a ruler.** 	**It must be insoluble in water as:** **((Stone or marble))** *** using ruler here is not correct way!!** 
We can calculate the volume of book by relation: **Volume = length × width × height.**	**Put piece of stone in graduated cylinder containing water.** 

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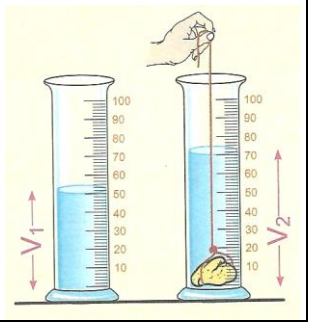
Steps of measuring the volume of irregular solid body (insoluble in water)

1 – pour amount of water in graduated cylinder and recored volume of water (V1)

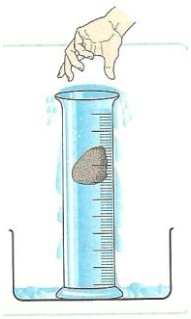
2 – put a piece of stone carefully in the cylinder and recored new volume of water + stone (V2)

3 – the volume of stone = V2 – V1 = …….. cm^3



Take care

When you put stone in a cylinder full of liquid , the liquid is spilled out !!



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Problems:

1 – find the volume of a brick , knowing that its length = 20 cm and its width = 10 cm and its height = 5cm

Answer
Volume of brick = length × width × height
= 20 × 10 × 5 = 1000 cm^3

2 – when we put a piece of marble in graduated cylinder containing 30 cm^3 of water the level raised to 50 cm^3 .
What is the volume of the marble?

Answer
Volume of the marble = V2 –V1 = 50 – 30 = 20 cm^3

The relation between volume and mass of matter

Equal volumes of different substances have different masses!!

Activity : to prove the equals volumes of different substances have different masses.

Steps:

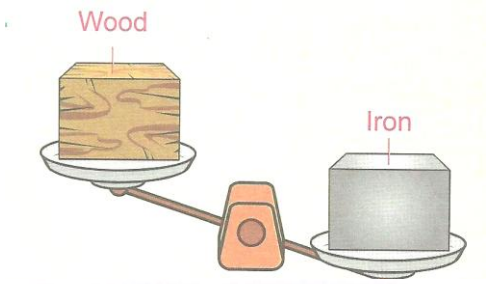
Get two cubes of iron and wood have the same volume.
Put them in the two pans of common balance.

Observation:

The iron cube has larger mass than wooden cube.

Conclusion:

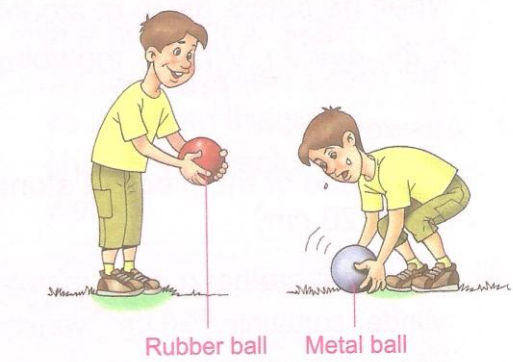
Equal volume of different substances have different masses.



Question??!

The opposite two balls have the same volume!!

1 – are the two balls have the same mass?!
2 – which one will have larger mass?!



Glossary

Texture	الملمس	Graduated cylinder	مخبار مدرج
Occupy	يشغل	Regular solid body	جسم صلب منتظم
Length	طول	Irregular solid body	جسم صلب غير منتظم
Matter	ماده	Estimating	تقدير
Volume	الحجم	Lower level	مستوي اقل
Measure	يقيس	Insoluble	غير ذائب
Mass	كتله	Pour	يصب
Deal	يتوافق	Horizontal	افقي
Dimensions	ابعاد	Width	العرض
Tiny	صغيره	Submerged	يغمر
Jewellery	مجواهرات	Spilled out	ينسكب
Chemicals	كيماويات	Record	يسجل
Laboratory	المعمل		

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Questions on lesson 1

Complete the following statements:

1 – measuring ruler is used for measure ……

2 – matter has …….. and ……..

3 – all matter are similar in occupying a space and this means that they have the same ……

4 – the length can be measured by some units as ……..and ……..

5 - …….. is suitable unit to measure the length of your pen.

6 - …… unit is used to measure small lengths, while ……. Unit is used to measure very large lengths.

7 – four meters = …… centimeters.

8 - ……. Is used to measure the distance between Carlo and Alexandria.

9 - …….. is used to measure mass of chemcical materials and gold.

10 - …….. unit is used to measure the mass of very big objects like cars.

11 – common balance used to measure ……

12 - …….. is used to measure the volume of orange juice.

13 – the litre unit is used to measure the ……..of liquids.

14 – cubic meter is the measuring unit of ……

15 – 1 litre = …… milliliter

16 – 3 litres = …… Cm^3

17 –the volume of a book can be calculated by multiplying …….. × …….. × ……

Choose the correct answer:

1 – milk has ……..

A; mass only b. volume only c. length d. a and b

2 - …… are the measuring tools of length.

A: graduated cylinder. B. sensitive balance

C: graduated ruler or tape. D: two pan balance .

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3 – five meters equal ……. Centimeters.
A: 200 b. 500 c. 20 d. 5

4 - …….. is used to measure very small masses in lab.
A: ruler b. sensitive balance c. tow pan balance d. glass

5 – gram and kilogram are units that measure the ……. Of any object.
A: length b. mass c. volume d. height.

6 – the jeweler uses …… to estimate the mass of jewellery.
A: conical flask b. graduated ruler c. sensitive balance d. two pan balance .

7 – the measuring cylinder can be used to determine the ……
A: volume of liquids. B. volume of irregular solid body c. mass of regular solid body
C: a and b

8 – two litres of water equal …… litres of milk.
A: 5 b. 2 c. 3 d. 4

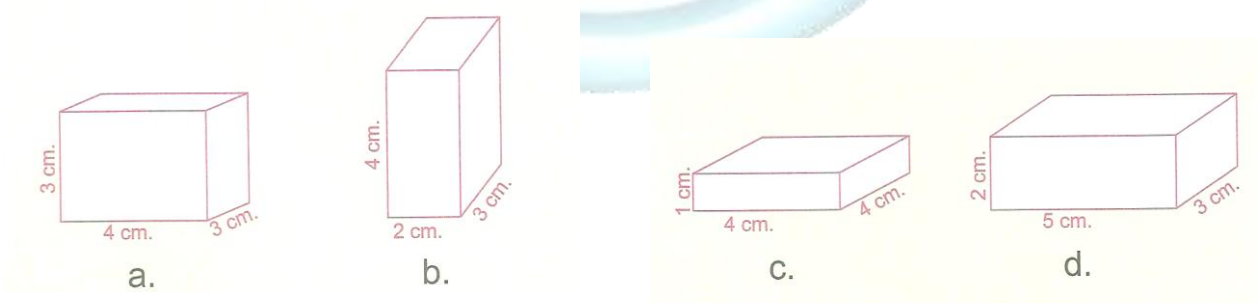
9 – the volume of sold material is measured by …….. unit.
A: cm b. cm^2 c. m^2 d. cm^3

10 – we can determine the volume of an irregular small stone that doesn't dissolve in water by using ……..
A: glass beaker b. measuring cylinder c. common balance d. graduated ruler.

11 – if the dimensions of your science book are 5 , 4 and 3 cm, so the volume of book = ... cm^3
A: 60 b. 120 c. 100 d. 80

12 – if you put a piece of iron in 50 cm3 that completely filled with water, a quantity of 20 cm3 is spilled out, so the volume of or iron piece = ……
A: 30 cm^3 b. 20 cm^3 d. 5 cm^3 c. 25 cm^3

14 – all the following objects are made of iron , which of them has the least volume?



Correct the underlined words:

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1 – three meters = 100 centimeters

2 – common balance is used to measure volume of objects.

3 – graduated tape is used to measure mass of fruits and vegetables.

Give reasons for :

1 –a glass is a matter ?

……

2 – air is matter ?

……..

3 – the car has a volume?

……

Mention the use of :

Graduated tape

……

Sensitive balance

……

Graduated cylinder

……

Define the following:

Matter : ……..

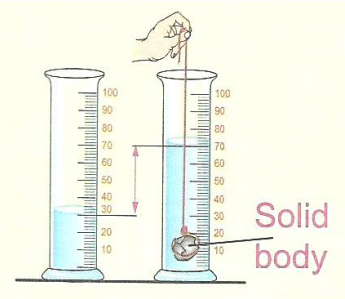
Mass: ……

Volume : ……..

Problem:

Look at the figure , then complete:

the volume of irregular solid body = ……



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My wishes,
Mr. Ibrahim Elsayed

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